

27. Campbell SB, Walker R, Tai SS, Jiang Q, Russ GR. Randomized controlled trial of sirolimus for renal transplant recipients at high risk for nonmelanoma skin cancer. *Am J Transplant*. 2012;12(5):1146-1156.

28. Euvrard S, Kanitakis J, Decullier E, et al. Subsequent skin cancers in kidney and heart transplant recipients after the first squamous cell carcinoma. *Transplantation*. 2006;81(8):1093-1100.

29. Wisgerhof HC, Edelbroek JR, de Fijter JW, et al. Subsequent squamous- and basal-cell carcinomas

in kidney-transplant recipients after the first skin cancer: cumulative incidence and risk factors. *Transplantation*. 2010;89(10):1231-1238.

## NOTABLE NOTES

### The Salem Witch Trials—Bewitchment or Ergotism

Leela S. Mundra, BS; Eric L. Maranda, BS; Jacqueline Cortizo, BS; Aleksandra Augustynowicz, BS; Shahjahan Shareef, BS; Joaquin J. Jimenez, MD

The Salem Witch Trials of 1692 represent not only a dark time in colonial America but also a curious medical mystery. The trials began when several young girls in Salem, Massachusetts, fell ill and developed unexplained symptoms, including temporary blindness, skin lesions, convulsions, and hallucinations. The local doctor, unsure of the etiology of their sickness, diagnosed the girls as having "bewitchment,"<sup>1</sup> a clinical judgment that led to the persecution and subsequent prosecution of the accused individuals. Puritan settlers held a firm belief in the supernatural due to a belief, originating in 14th century Europe, that witches existed through the work of the devil.<sup>1</sup> This preexisting culture of superstition, along with ongoing warfare against surrounding villages and fear of attack from Native Americans, contributed to the mass hysteria preceding the witch hunt.<sup>1</sup> Following the trials, many scholars theorized about the true cause of the mysterious illness; a plausible explanation is convulsive ergotism.

Ergot poisoning is caused by the ingestion of alkaloids produced by the *Claviceps purpurea* fungus present in rye and other grains. Outbreaks of ergotism are more likely to occur in the spring after a cold and wet winter in rural regions where rye is a common source of nutrients.<sup>2</sup> The weather conditions preceding the epidemic in Salem, where cultivation of rye was commonplace, were ideal for just such an outbreak.

The 2 types of ergotism, gangrenous and convulsive, present with similar symptoms, including crawling sensations in the skin and pain in the extremities. Gangrenous ergotism results from the vasoconstrictive effects of the ergotamine toxin, resulting in desquamation and necrosis of tissue, edema, and loss of peripheral sensation.<sup>1</sup> In Salem, some of the accused experienced discoloration and edema of the skin de-

scribed as a "witch's mark."<sup>2</sup> Convulsive ergotism causes distortion of the trunk and limbs, with painful dystonia of the fingers, wrists, and ankles.<sup>2</sup> Victims of ergotism describe feeling delirious, lethargic, and manic, and even report hallucinations or changes in vision.<sup>2</sup> Court records of the Salem Witch Trials tell of symptoms resembling those of ergotism, including "temporary blindness, deafness, burning sensations, and visions like a 'ball of fire' or 'multitudes in white glittering robes.'"<sup>3</sup>

The enigmatic epidemic that swept through the village of Salem, along with the witch hunt that followed, is a noteworthy example of how medicine and history are often intertwined. While there are several theories surrounding the outbreak in Salem, there are certain manifestations of the illness, such as its characteristic skin lesions, which cannot be explained by these alternative theories. The dermatological findings in the victims of the Salem Witch Trials are invaluable in unraveling the truth behind what was once thought to be the workings of witches.

**Author Affiliations:** University of Miami, Miller School of Medicine, Department of Dermatology and Cutaneous Surgery, Miami, Florida.

**Corresponding Author:** Eric L. Maranda, BS, University of Miami, Miller School of Medicine, Department of Dermatology and Cutaneous Surgery, 1475 NW 12th Ave, Miami, FL 33136 (Emaranda@med.miami.edu).

1. Trials S. Salem Witch Trials—Facts & Summary. <http://www.history.com/topics/salem-witch-trials>. Accessed September 20, 2015.

2. Eadie MJ. Convulsive ergotism: epidemics of the serotonin syndrome? *Lancet Neurol*. 2003;2(7):429-434.

3. Matossian MK. Ergot and the Salem witchcraft affair. *Am Sci*. 1982;70(4):355-357.